

AMENDMENTS TO THE SPECIFICATION:

Please add the new paragraph on page 1, line 2, after the title, "PREPARATION OF LIGHT VALVES".

CROSS-REFERENCE TO RELATED APPLICATIONS

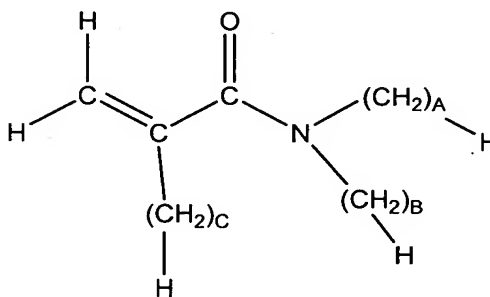
This application is a national stage of International Application No. PCT/US2004/010979, filed 9 April 2004, which claims benefit of U.S. Provisional Patent Application No. 60/461,141, filed 9 April 2003. The entire contents of all the above-identified applications are incorporated herein by reference.

Please delete the paragraph 16, at page 7 and 8, and insert the replacement paragraph as indicated below:

NEW MATERIALS

[016] There is a class of monomers, some of whose members satisfy all of the above Monomer Specifications and Requirements when they are used with water as the solvent: the N-substituted acrylamides. A simplified general structure for some of these monomers, along with 7 examples of monomers of interest, as is shown below:

Typical Acrylamide Monomers



Number	Acronym	Chemical Name	A	B	C	A+B+C
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1	DEA	N- diethyl acrylamide	2	2	0	4
2	DMA	N- dimethyl acrylamide	1	1	0	2
3	TBA	N- tertiary butyl acrylamide	4	0	0	4
4	DMMA	N- dimethyl methacrylamide	1	1	1	3
5	MEMA	N- methyl ethyl methacrylamide	1	2	1	4
6	DEMA	N- diethyl methacrylamide	2	2	1	5
7	DMEA	N- dimethyl ethacrylamide	1	1	2	4

Please delete the paragraph 17, at page 14 and 15, and insert the replacement paragraph as indicated below:

[017] K and E form the basic polymer backbone. They are saturated hydrocarbon chains with protruding methyl or ethyl groups, and with terminal hydroxy functionality. The different sized groups protruding from the chain in somewhat random locations prevent close packing of the chains and subsequent crystallinity, and the flexible hydrocarbon backbone makes the resulting crosslinked sealant polymer a rubber, rather than a plastic. The saturation provides high resistance to thermal oxidation, solar ultraviolet light, hydrolysis, unwanted crosslinking or chain scission and a very low rate of water permeation ~~water permeation~~. The hydroxy functionality allows turning both of these high viscosity liquid polymers (K and E) into a solid rubber by chain length extension, and by crosslinking the chains into a three dimensional net structure. The terminal location of the functionality gives more rapid and complete chain length extension and crosslinking and also greater mechanical strength. The elastic modulus and elongation of the sealant is determined by the ratio of E to K. More E, with its functionality of greater than 2, gives more crosslinks, and thus less elastic elongation and higher modulus of elasticity. K and E are relatively expensive because they are manufactured in small quantities.

Please delete the paragraph 18, at page 15, and insert the replacement paragraph as indicated below:

[018] T is a diisocyanate, which reacts with the hydroxy functionality of K and E to form the chain length extension and crosslinks or "cure". This diisocyanate crosslinker is preferred because it reacts relatively rapidly at 20°C and is also resistant to thermal oxidation and sunlight, because it is also based on a saturated hydrocarbon, and especially because it is

soluble in K and E. Poor mutual solubility of any of the ingredients results in an only partial cure. The protruding methyl groups make T soluble in K and E and also increase the sealant's flexibility by preventing the reacted or cured isocyanate groups from associating with each other due to their high polarity. The amount of T is 105% of stoichiometric, so that the excess will compensate for the adsorption of and reaction with atmospheric moisture during compounding, storage, and cure, which would deactivate its isocyanate functionality, thereby preventing a complete cure. Stoichiometry is based on the total hydroxy functionality of K, E, and P. The excess T also helps adhesion. T is highly toxic, but has a low vapor pressure at 20°C, so that skin contact, but not vapor inhalation, must be avoided.

Please delete the paragraph 41, at page 17, and insert the replacement paragraph as indicated below:

[041] The formulation used for the light valve samples shown in Figures 2, 3, and 4 is, by weight, 35% monomer (consisting, ~~by weight~~ of DEA, optionally + DMA or TBA) + 0.2 % MBA + 0.04% each of sodium persulphate and sodium metabisulphite + 0.2 % pentamethyl piperidone. The ~~procedure~~ procedures described above in the Laboratory Preparation section were used. The optically active gel layer of these samples was 2 millimeters thick. The cover sheets were glass, and the above sealant formulation was used.

Please delete the paragraph 50, at page 19, and insert the replacement paragraph as indicated below:

[050] 7. The sandwich is cooled to e.g. 5° C. A chamber with circulating cold air may be used. Inside this cooling chamber there may be a tilt table on which the glass/cavity/glass sandwich is placed during its cooling, filling and, optionally, during its polymerization or gelling. Alternately, the sandwich may be cooled by placing it on a flat metal plate which is cooled, and placing a layer of thermal insulation on top of the sandwich. The dispenser of the mixed A, B and possibly C solutions, may be housed in a ventilated glove box for safety from toxic monomers, and may also be inside this cooling chamber.

Please delete the paragraph 51, at page 19, and insert the replacement paragraph as indicated below:

[051] 8. The dispenser needle(s) or die(s) may be inserted into the side of the sandwich by hand or in an automated fashion. Simultaneously with Step 7, the sandwich cavity is flushed with an inert gas through the injection die(s) or needle(s).

Please delete the paragraph 58, at page 22, and insert the replacement paragraph as indicated below:

[058] 10. After the filling and bubble removal are completed, the tilt table is made horizontal so that the thickness of the mixed parts A, B and possibly C, is uniform, for uniform reflectivity and appearance when the light valve is above its switching temperature and is white. In this horizontal position, the sample may be cured e.g. for 10 minutes at 5° C. In order to increase production line speed, during cure the sandwiches may be stacked horizontally with space between them for circulating cold air to remove the heat of polymerization. This stacking is analogous to the stacking in the oven to cure the silane (Step 4). However, in this case, the stack of sandwiches must move with very little vibration or deviation from the horizontal, because these may disrupt the formation of a strong, homogeneous gel that is well bonded to the two cover sheets.

Please delete the paragraph 59, at page 22, and insert the replacement paragraph as indicated below:

[059] 11. The outer seal is applied, either manually or with automated machinery. It may be made of the same 2 components as used for the outer seal in the Laboratory Procedure (see the description of a sealant above). Approximately 10% of a finely divided carbon or silica filler may be added to this formulation in order to make it thixotropic, so that the sandwich can be handled immediately after application of the sealant, and before the sealant has gelled or cured. These 2 sealant components are mixed together and dispensed using a meter/mix machine which may be similar to the meter/mix used for pumping and mixing the solution parts A, B and possibly C except that: there are only 2 components for the sealant; the

accuracy of the ratio is not as critical; and the viscosity of the sealant is much greater, approximately 15,000 centipoises.

Please delete the paragraph 62, at page 23, and insert the replacement paragraph as indicated below:

[062] A rapid manufacturing process for light valve samples and products is made possible by using a low viscosity solution of molecularly designed monomers, ~~such as~~ for example, aqueous solutions of N-substituted acrylamide monomers with low melting points, and an acrylamide crosslinking or difunctional monomer, all of which, after filling a glass/cavity/glass sandwich, are polymerized with a previously added catalyst of e.g. persulfate + metabisulphite salts. A sealant which cures at room temperature, resists degradation by water, oxygen, heat and sunlight, may be thixotropic before curing, has low modulus, high elongation, and is extremely impermeable to water can be made from saturated hydrocarbon liquid polymers with terminal hydroxy functionality and saturated hydrocarbon diisocyanates.

Please delete the paragraph 63, at page 24, and insert the replacement paragraph as indicated below:

[063] A coherent set of procedures, materials, equipment, and process parameters for preparing and manufacturing light valves are described above. These light valves perform satisfactorily as architectural glazings, and in other applications, regarding: range of switching temperatures available, sharpness of switching temperature, opacity or reflectivity when switched off (white), high light transmission and optical quality when switched on (transparent), uniformity of switching ~~temperature=~~ temperature, minimal change of switching temperature and absence of optical defects, haze, or yellowing after accelerated aging by: extended heating, repeated switching, water loss, or concentrated solar ultraviolet light.

Please delete the paragraph 64, at page 24, and insert the replacement paragraph as indicated below:

[064] The time for filling a 1 square meter glass/cavity/glass sandwich with a 2 millimeter thick cavity is typically 1 minute (improved over the prior art by a factor of approximately

50), and the time after filling to forming a gel is typically 10 minutes (improved over the prior art by a factor of approximately 20). Since the filling and gelling were, in the prior art, the slow steps in sample and product preparation, both of these improvements taken together make possible a rapid mass production process. ~~Manufacturing~~ Typical manufacturing methods, machinery, materials, and process parameters, all of which are suitable for mass producing light valves for architectural glazings, are described in detail above. All of the above materials, methods, and process parameters are by way of illustrating the more general categories of the basic inventions claimed herein.